

Fig. 14. *Peltogaster sulcatus*; the animal seen from the left side: *a*, the organ of adhesion; *b*, the anterior orifice of the body.

Fig. 15. *Peltogaster microstoma*; the animal seen from the left side: *a*, the organ of adhesion; *b*, the anterior orifice of the body.

Fig. 16. The larva of *P. microstoma*, at the point of being hatched, seen from above.

Fig. 17. The larva of a *Pachybdella* (after Cavolini).

XXXV.—On the Arrangement of the Land Pulmoniferous Mollusca into Families. By Dr. J. E. GRAY, F.R.S., V.P.Z.S.

THE opportunity of examining the genus *Ancitea*, and the additional information obtained by the publication of the anatomy of it by Dr. Macdonald, and of that of *Janella* by Mr. Knight, has induced me to reconsider the subject of the arrangement of the terrestrial Pulmonata or *Pulmonata geophila*, given in the Catalogue of Pulmonata, or Air-breathing Mollusca, in the British Museum, published in the year 1855.

I would suggest, for the arrangement given at page 2 of that Catalogue, the following:—

1. PULMONATA GEOPHILA. Eyes at the apex of an elongated cylindrical peduncle. Tentacles cylindrical, shorter and lower down than the eye-peduncle, sometimes very small or wanting. Operculum none (except in young *Cryptellæ*?). Terrestrial.

A. Head, eye-peduncle, and tentacles retractile under the skin.

Sect. 1. VERMIVORA. Buccal mass very large, elongate, projectile like a proboscis. Jaw none; teeth numerous, slender, conical, distant. Mantle well defined. Subterraneous; carnivorous, or worm-eating.

* *The spiral part of the body near the middle of the back. Head without any lateral grooves from the front of the mantle to the outer edge of the eye-peduncles.*

1. OLEACINIDÆ. The tentacles cylindrical, simple; the labial tentacles elongate, produced, flat, angularly bent. Shell oblong, spiral; the outer lip thin, sinuous. *Oleacina*.

It is to be observed that some *Helicinidæ* have shells so like *Oleacina* (as, for example, *Achatina folliculus*), that it is impossible to distinguish them from the shells of true *Oleacina*; yet Moquin-Tandon has figured the animal and the jaws of them, showing their Helicine character and phytophagous habit (see t. 20 & 22), and the animal and jaws have been observed in several other species that have been referred to this genus on account of the form of shell. The genus *Halea*, which differs from *Oleacina* only in

being more ventricose, is said to have an animal like *Buccinum*, and to live in the seas,—another example of the impossibility of defining with accuracy and certainty, from the examination of the shell alone, the genus, family, or even order to which a Mollusk may belong.

2. STREPTAXIDÆ. The tentacle cylindrical, bifid, as if it were the tentacle and the labial tentacle united. Shell subglobose; the large whorls excentric, flattened. Peristome thickened. Carnivorous; eating other Slugs and Mollusca. *Streptaxis*.

** *The spiral part of the body on the hinder part of the back. Back and head with two or four lateral grooves from the front of the mantle to the side of the head, including the eye-peduncle and tentacles.*

3. TESTACELLADÆ, Catal. p. 9. *Testacella* and *Daudebardia*. Eating worms.

Sect. 2. PHYLLOVORA. The buccal mass small, ovoid, not produced. Jaw distinct, horny; teeth numerous, four-sided, close together on the lingual membrane. Herbivorous.

* *Mantle (either discal or spiral) defined, on the middle of the back. Pulmonary cavity under the mantle, and attached to it. Head without any lateral grooves.*

4. HELICIDÆ. Foot tapering behind, without any subcaudal gland. Adult and young alike. (See Tribes in Catalogue, p. 155.)

I may observe that many of the genera referred by Mr. Adams to the family *Oleacinidæ* have no affinity with it, and belong to this family.

5. ARIONIDÆ. Tail with a distinct gland rather above the foot. Adult and young alike. *Arion*, *Geomalacus*, &c.

** *Mantle convex, on the middle of the back of the animal. Pulmonary cavity under the mantle, and attached to it. Head with a central and two lateral diverging grooves enclosing the eye-peduncles.*

6. PARMACELLIDÆ. Mantle central, large, shield-like, free in front, more or less covered with a spiral shell. Young and adult alike. Foot truncated behind, with a subterminal gland. *Parmacellus*, *Mariella*, *Laconia* (Cat. pp. 62, 63), *Vitrinella*, *Nanina*, and the allied genera will probably be found to belong to this family when the animals are more closely examined. The genus *Helicolimax* (Cat. p. 181) differs from it in having no

subcaudal gland, and a deep central dorsal posterior groove; this may be the type of another family.

So great is the difficulty of procuring the animals of exotic land-shells for examination, that we can make only very gradual attempts at revising the arrangement of them; and great caution becomes necessary, since we find that shells similar in external appearance and character have animals of different conformation and habits.

7. **CRYPTELLADÆ.** Mantle central, large, shield-like, free in front. Young animal with an operculum, which is at length deciduous, and protected by an external shell, which afterwards becomes hidden in the shield-like mantle of the adult animal. Jaw and teeth of *Helix*. *Cryptella*, *Drusia*, and *Gerasia* (Cat. pp. 7 & 61).

8. **ANEITEADÆ.** Mantle small, inequilateral, flat, sunken, enclosing a shelly plate. Back with a central groove, giving out opposite branches to the sides. Neck with two distinct diverging grooves to the lips. Jaw horny; teeth squarc. *Aneitea*.

9. **JANELLADÆ.** Mantle verysmall, convex, sunken in the dorsal grooves, enclosing four small plates. Back with a single central dorsal groove. Neck with two grooves, parallel and close together behind, and then separating and extending to the outside of the eye-peduncle. Skin spinulose. Tongue very broad. Teeth oblique, strongly dentated. *Janella*.

****Mantle covering the whole of the back. Respiratory chamber small, thin, in the front of the body, separate from the mantle. Head without any groove. Eye-peduncle and tentacle distinct. Jaw and tongue like Helix.*

10. **PHILOMYCENIDÆ.** *Philomycus* and *Meghimatium*. (See Cat. p. 156.)

B. *Head, eye-peduncle, and tentacles simple, contractile. Teeth numerous, four-sided, close on the lingual membrane.*

11. **VERMICELLIDÆ.** Body elongate. Tentacle bifid. (See Cat. p. 4.)

12. **ONCHIDIADÆ.** Body ovate. Tentacles cylindrical, simple. (See Cat. p. 4.)